



INC of IAH Indian National Chapter International Association of Hydrogeologists

Newsletter

VOLUME 09 ISSUE 02 JUNE, 2022



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Governing Body (2022-24)

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Dr. Sudhir K. Srivastava

Designed and composed
by Dr. Ashok Kumar,
Treasurer, INC-IAH



INC of IAH

HQ. c/c Central Ground Water
Board, Bhujal Bhawan, NH-IV,
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www.inciah.org

President's Message

Prof. A. K. Sinha

President, INC of IAH

Vice-Chancellor,

Chhatrapati Shivaji University, Navi Mumbai

Member, Governing Council, IUAC, GOI, New Delhi
and Founder Groundwater Community Forum

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Dear IAH Members Friends & Colleagues

It is matter of great pleasure indeed for me to interact with you through this issue of INC-IAH newsletter which is loaded with highly relevant information pertaining to the science of hydrogeology and sustainable management of groundwater resource.

Subsequent to the waning of movement restrictions owing to Covid pandemic, the year 2022 has become highly significant and full of opportunities for scientists, practitioners and user of groundwater as good number of events to address the challenges facing the sustainability of groundwater have been and being organized in online and offline mode enabling one to learn best emerging and innovative outcome and practices in the domain of groundwater. Few such events which deserve special mention are World Water Day 2022 (22nd March), Bonn Climate Change Conf (6 -16 June), Stockholm water Week (23 Aug -1st Sept); Cairo water

week (16-19 Sept Oct); Water Security and Climate Change (1-3 Dec), XVIII World Water Congress (11-15 Sept); 49th IAH Congress (18-23rd September) and UN-Water Summit on Groundwater | 7-8 December, Paris. The 49th IAH congress with its theme on Groundwater and Poverty reduction is going to be an important milestone in quest for sustainability of Groundwater system and its use. Being one of the members of the Scientific Committee of the Congress I wish large number of scientists including all IAH members from India participate in the congress and avail the opportunities to interact with domain expert from all over the world. Details of these events may be found in this newsletter or from the respective sites. I am sure our young friends and midcareer scientists and academicians would seize these opportunities.

We are at half past 2022. Almost all necessary financial and administrative formalities to make present EC of INC IAH fully functional have been put to order by the hard work of our esteemed members and members of EC. As spelled out earlier INC IAH focus is on skilling our youngster, assisting water policy maker and helping small group and individual end user including farmers. We are in process of formulating relevant program to this end with due consultation of one and all and by approval of EC. INC-IAH is seriously pursuing to procure ISSN number for our Journal of Geohydrology. Further it is felt that the financial health of INC-IAH needs to be strengthened and its social and scientific visibility be enhanced beyond Pan India. We need to socially connect our professionalism by adopting a civil science approach. We will soon be in touch with you individually or in groups to find agreeable ways and means. I on behalf of EC solicit your kind indulgence and support to fulfil, the above needs of the INC-IAH

I feel it obligatory to thank profusely to [Dr Ashok Kumar](#), Treasurer, INC-IAH and his team at large for their great initiative and massive effort in bringing out this excellent newsletter.

Wish you all, your family members and your friends very happy and healthy days ahead.

Thanks, and regard

(A. K. Sinha)

Secretary's Message



Sh. Amlanjyoti Kar

Secretary, INC of IAH

*Former Regional Director, Eastern Region
Central Ground Water Board, Kolkata,
Ministry of Jal Shakti, Government of India,
E: amlanjkar@gmail.com*

It gives me profound pleasure to note that the second issue of the E-Newsletter of INC-IAH in this calendar year is going to be brought out. We could bring out the first issue during the celebration of the world water day on 22nd March, 2022. Hence, the current issue is being published as per the desired timeline. The World Water Day was organized befittingly from the national platform and an online seminar was organized where [Shri Shashi Sekhar](#), IAS(Retd.) and Former Secretary, Ministry of water Resources, [Prof. A. K. Sinha](#), Vice Chancellor CSRU, Navi-Mumbai and President INC-IAH, [Shri Sunil Kumar](#), Chairman, CGWB & CGWA and Patron, INC-IAH, [Shri Biswadeep Ghosh](#), Country Director, Water for People, India spoke on the focal theme of “Groundwater making invisible visible” on various burning issues of ground water over development and management, ongoing govt. policies including need for participatory ground water management by the stakeholders in India. The seminar was moderated by the undersigned while [Shri Sujit Sinha](#), Executive council member of INC-IAH offered the vote of thanks. [Dr Ashok Kumar](#), Treasurer has painstakingly organized and recorded the online seminar and its record has been uploaded in the website.

Apart from the celebration from the National Platform organized by INC-IAH, the programme of World Water Day on 22.03.2022 was also organized in many parts of the country where our esteemed members were invited for deliberation. Prior to organize the World Water Day seminar by INC-IAH, it was also decided in the Executive council meeting to celebrate the event in a more elaborative manner, so that the message of the theme of World Water Day,2022 could be well promulgated all over the country through a week-long programme of “world water week” during 21.3.2022 to 26.3.2022, where the local qualitative and quantitative issues would be highlighted. Accordingly, the World Water week was well celebrated in Pan India in collaboration with INC-IAH and many universities and colleges located in West Bengal, Maharashtra, Rajasthan, Haryana, Tripura, Kerala including at far flung Port Blair in Andaman and Nicobar Islands. There were webinars as also offline Seminars during the occasion and there has been overwhelming participation of stakeholders as listeners from all walks of life.



INC of IAH

HQ. c/c Central Ground Water Board, Bhujal Bhawan, NH-IV, Faridabad – 121001

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The INC-IAH is endeavouring to reactivate the E-Journal with an editorial board studded with a group of internationally reputed academicians from India and overseas including the renowned water professionals. We have also a plan to start popular lecture series at the earliest by the eminent researchers and experts from abroad and India. Simultaneously our efforts to publish the Newsletter in regular interval will continue. I request all the members to kindly submit your short articles for the same. I also request all the members to kindly support our humble endeavour to make our association more vibrant and efficient so that the INC-IAH can emerge as one of the most active chapters of the global association and kindly forward your constructive suggestion to me and the President INC-IAH for its improvement.

It also gives me immense pleasure to inform you that recently [Prof. Tapas Biswas](#), Senior Advisor, CSIRO and Professor Australian National University, Canberra, [Dr R. S. Chatterjee](#), Scientist-G & Head Geoscience Division, IIRS, Dehradun have joined INC-IAH which has enriched our association.

At the end I would like to convey my heartfelt thanks to [Shri Satendra Kanwar](#), Chief Engineer (Retd.), Ground Water Department (GWD), Govt. of Rajasthan to inspire the officers of GWD from all the disciplines of to join INC-IAH and through their joining our membership drive in the recent time has been remarkable. I also thank all the other new members as also the old members, who have renewed their membership. They belong to the academia, CGWB also from the industry. I convey my regards to the esteemed members and hope all goodness for them and their family members in the ensuing time.

([Amlanjyoti Kar](#))



Imagine one day without water



जल है तो जीवन है,
जीवन है तो पर्यावरण
है, पर्यावरण से ये धर
ती है, और इस धरती
से हम सब हैं!

Water Conservation Tips

Conservation of water at home

- Water should not be wasted. Leaking taps must be repaired and all taps should be closed when not in use.
- Hand pumps should be well maintained to perform effectively.
- Overhead storage tanks should be maintained in good condition. PVC tanks which are cheaper and lighter in weight and which will not corrode or rust are preferable to metal tanks.
- Rain water can be collected and stored for domestic purposes.

Conservation of water by the community

- Canals, tanks, etc. must be de-silted regularly during the summer months.
- People should be encouraged to revive the ancient practice of protecting trees around tanks. Major rivers should be sanctified and groves established around villages and on the river banks.
- Afforestation of barren, hilly slopes on a warfooting should be carried out. Trees withstand drought better than crops. They trap dust, replenish streams, provide shade to cattle and man and give fodder for cattle. Their uses to man are innumerable. Denuding the land of trees without compensatory afforestation is a suicidal and short sighted approach to solving immediate needs.
- Creation of small reservoirs and percolation tanks to hold run-off water must be implemented and maintained well.

SOFTWARE

5 open source groundwater software besides MODFLOW

Modflow OWHM

The MODFLOW One-Water Hydrologic Flow Model is a MODFLOW-2005 based integrated hydrologic model designed for the analysis of conjunctive-use management. <https://www.usgs.gov/software/modflow-one-water-hydrologic-flow-model-conjunctive-use-simulation-software-mf-owhm>

IWFM: Integrated Water Flow Model

Integrated Water Flow Model (IWFM) is a computer program used for water resources management and planning within a basin.

<https://water.ca.gov/Library/Modeling-and-Analysis/Modeling-Platforms/Integrated-Water-Flow-Model>

WRF-Hydro

The Weather Research and Forecasting Model Hydrological modeling system (WRF-Hydro) was developed as a community-based, open source, model coupling framework designed to link multi-scale process models of the atmosphere and terrestrial hydrology to provide:

https://ral.ucar.edu/projects/wrf_hydro/overview

Parflow

ParFlow is a numerical model that simulates the hydrologic cycle from the bedrock to the top of the plant canopy. It integrates three-dimensional groundwater flow with overland flow and plant processes using physically-based equations to rigorously simulate fluxes of water and energy in complex real-world systems.

<https://parflow.org>

dfnWorks

dfnWorks is a parallelized computational suite to generate three-dimensional discrete fracture networks (DFN) and simulate flow and transport.

<https://dfnworks.lanl.gov>



Groundwater News in Media

Developer fined Rs 100 crore for violating environmental laws in Gurugram residential project
PTI, 21 June, 2022 11:02 pm IST

<https://theprint.in/india/developer-fined-rs-100-crore-for-violating-environmental-laws-in-gurugram-residential-project/1006531/>

Chennai: Authorities release water from Chembarambakkam reservoir in June for first time in many years

Written by Janardhan Koushik | Chennai | June 22, 2022 1:17:10 pm

<http://www.uniindia.com/iit-low-cost-and-one-of-a-kind-e-coli-water-testing-kit-to-check-contamination-in-drinking-h2o/north/news/2761904.html>

Groundwater monitoring yields encouraging results in Chikkaballapur villages In Bagepalli, groundwater monitoring exercises began with 99 open wells in the pre-monsoon days of 2020 Chiranjeevi Kulkarni, DHNS, Bengaluru,

<https://www.deccanherald.com/state/karnataka-districts/groundwater-monitoring-yields-encouraging-results-in-chikkaballapur-villages-1118502.html>

Haryana, Israel sign pact on water cooperation

Tribune News Service, Chandigarh, June 15

[Haryana, Israel sign pact on water cooperation : The Tribune India](#)

Lucknow, a case study for permanently disappearing aquifers in north India
by Monika Mondal on 16 June 2022

<https://india.mongabay.com/2022/06/lucknow-a-case-study-for-permanently-disappearing-aquifers-in-north-india/>

'Water Champion' Neeta Patel's conservation innovations are helping tribals in Gujarat's hinterlands

<https://www.indiatoday.in/india/story/water-champion-neeta-patel-conservation-innovations-helping-tribals-gujarat-1964617-2022-06-20>

Lakhs of litres of groundwater extracted ..

http://m.timesofindia.com/articleshow/92094083.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

India to try new groundwater recharge method to solve water problem

AP 2 min read . Updated: 19 Apr 2022, Swati Luthra, Gireesh Chandra Prasad

<https://www.livemint.com/news/india/india-to-try-new-groundwater-recharge-method-to-solve-water-problem-11650308385108.html>

EYE ON IT

Current trends in hydrogeology

Peter Meyboom

There are two current trends in hydrogeology, which may be referred to as the "inward look" and the "outward look". The inward look is directed principally at the very fundamentals of flow in porous media. It involves the re-examination and extension of Darcy's law, as well as attempts towards unification of the microscopic and macroscopic view points. The outward look is aimed at large conceptions of groundwater flow: hydrodynamic flow systems, hydrochemical flow systems and hydrothermal flow systems. These two trends seem to be developing more or less independently, a fact that may reflect a basic difference in training and inclination of the scientists involved. On the one hand we notice mainly the advances made by physicists and mathematicians, whereas the principal representatives of the second group are engineers, geologists and geophysicists. However, there is no doubt about the ultimate union of these two trends.

[https://doi.org/10.1016/0012-8252\(66\)90034-1](https://doi.org/10.1016/0012-8252(66)90034-1)

World Water Day & INC-IAH World Water Week



INDIAN NATIONAL CHAPTER (INC) OF
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (IAH)
INVITES TO THE WEBINAR

ON 22ND MARCH, 2022 AT 11.00 TO 13.00 HRS

On the occasion of

World Water Day-2022

Theme : Groundwater : Making Invisible to Visible

To join the video meeting, click this link : <https://meet.google.com/bth-aksg-jrd>

Eminent Speakers



Prof. (Dr) A. K. Sinha
Vice-Chancellor,
CSM University, Navi Mumbai,
President, Indian Chapter of IAH



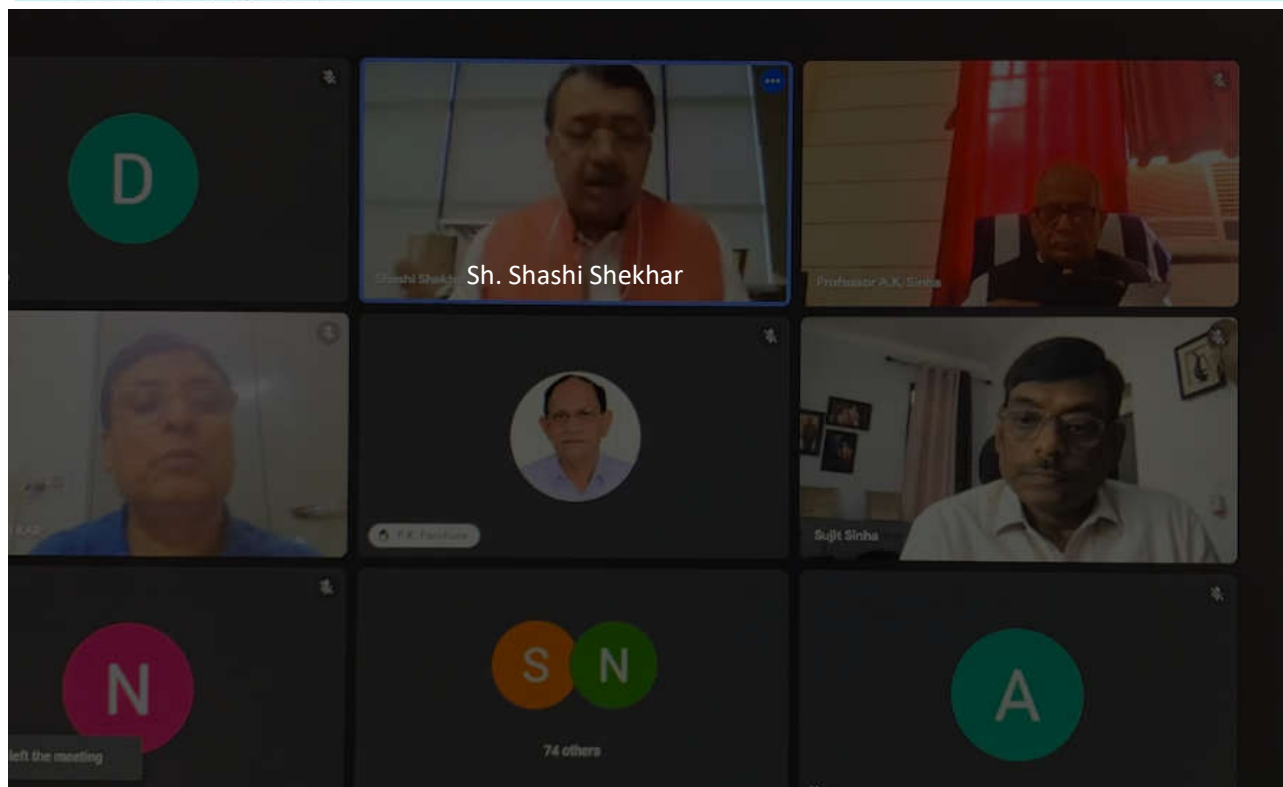
Sh. Sunil Kumar, Chairman
Central Ground Water Board (CGWB)
Govt. of India, Faridabad



Sh. Shashi Shekhar, IAS (Retd.)
Former Secretary, MoWR, RD & GR
Govt. of India, New Delhi



Sh. Biswadeep Ghose
Country Director
Water for People, India



Shri Shashi Shekhar, IAS (Retd.), Former Secretary, MoWR, RD&GR, Govt. of India delivered invited talk on the occasion of World Water Day



Sh. Sunil Kumar, Chairman, CGWB, GoI and Patron of INC and Sh. Biswadeep Ghose, Country Director, Water for People, India have delivered invited talk on the occasion of World Water Day



Dr Arunangshu Mukherjee, Vice President, INC-IAH delivered a talk on the occasion of World Water Day organized by Dept. of Environmental Engg., Delhi Technological Institute and Institute of Engineers at New Delhi



Webinar on Groundwater- Making the invisible visible

Organized By

Chhatrapati Shivaji Maharaj University & INC-IAH

Date :- 22-03-2022

Time: 3: 00 PM Onwards

Chief Speaker
Prof. (Dr.) N.J. Pawar
Vice-Chancellor
Dr. D. Y. Patil Vidyapeeth (DPU) Pune

Chief Patron
Dr. Keshav Badaya
President
CSMU, Navi Mumbai

Speaker
Prof. (Dr.) A. K. Sinha
Vice-Chancellor
CSMU, Panvel, Navi Mumbai

WORLD WATER DAY

Advisors

Prof. (Dr.) R.P.Sharma
(Registrar, CSMU)

Dr.Aurab Chakrabarty

Coordinators

Prof.(Dr.)Yatindra Kumar

Department of Biotechnology

Dr.Md.Daniyal

Department of Civil Engineering

Dr.Sanjog Kumar Choudhary

Department of Geology



Link (for free) : <https://meet.google.com/srt-ixdc-uua>



For Enquiry :- info@csmu.ac.in Contact No. :- +91-7417246066

Website:- www.csmu.ac.in

Add.:- Near Shedung Toll Plaza, Old Mumbai - Pune Highway, Panvel, Navi Mumbai-410206

Prof. (Dr.) N. J. Pawar, Vice-Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune and Prof. (Dr.) A. K. Sinha Vice-Chancellor, Chhatrapati Shahu Ji Maharaj University, Navi Mumbai delivered invited talk on the occasion of World Water Day organized by the Chhatrapati Shahu Ji Maharaj University, Navi Mumbai



The Department of Geology and
The Department of Geography,
Presidency University,
Kolkata



In collaboration with
Indian Chapter (INC) of International Association of
Hydrogeologists (IAH)
Observe the World Water Week
[21.03.2022-26.03.2022]
and
Cordially invite you to join the online talk

**"Groundwater:
Making the invisible to
visible"**

on
25.03.2022 [14.00 pm onwards]
by
Shri. Amlanjyoti Kar
[Former Regional Director, Central Ground Water Board & Secretary, INC-IAH]

JOINING LINK:
<https://meet.google.com/qye-zfnn-vvd>

Convenor
Dr. Aditya Sarkar
Department of Geology, Presidency University



University of Calcutta
Department of Geography



In Collaboration With
**Indian National Committee of International
Association of Hydrogeologists (INC-IAH)**

"GROUNDWATER: MAKING INVISIBLE TO VISIBLE"

24 March 2022 (3 PM to 5 PM)
Venue: Department of Geography, Ballygunge Science College

Observe
World Water Week (21 March to 26 March 2022)

SPEAKERS

Prof.(Dr.) Asis Mazumder
Jadavpur University
and
Director, School of Water Resources Engineering

Amlanjyoti Kar
Former Regional Director,
CGWB & CGWA,
Ministry of Jal Shakti, Govt. of India
and Secretary, INC-IAH

Sh. Amlanjyoti Kar, Secretary, INC-IAH delivered invited talk organised by the Presidency University and the Calcutta University at Kolkata on the occasion of the World Water Week



Naba Barrackpur Prafulla Chandra
Mahavidyalaya



Observation
of
World Water Week
(21.03.2022 - 26.03.2022)
"Ground Water : Invisible to Visible"

Jointly Organized by
**Indian National Committee of International
Association of Hydrogeologists (INC-IAH)**
&
Department of Geography
In collaboration with
Internal Quality Assurance Cell (IQAC)



Speaker: Shri Amlanjyoti Kar
Formerly Regional Director Central
Ground Water Board & Secretary,
INC-IAH
Date: 26th March, 2022
Time: 2:00 pm onwards

Concept Note
Groundwater, the "unseen" part of hydrological cycle, is a finite water resource and constant exchange of water to surface water bodies and vice versa takes place. India is the largest ground water user in the World which is considered key components for sustainable development and food and water security of nation for its availability in time and space, its protected quality, its better resistance towards climatic odds etc. Groundwater depletion is becoming a global problem with increasing populations and industrialization coupled with changing climate which have adverse effect on its quality and sustainability. The webinar is being organized to propagate the message of importance of ground water and the need for its management and sustainable development in India in general and West Bengal in particular.

Registration link: [Click here](#)
Joining link:
<https://meet.google.com/qcf-kofe-jnu>
<https://youtu.be/sEZ5a4JYotU>

Convenor: **Dr. Diyali Chattaraj**

Organizing Committee
Dr. Parama Bannerji (HOD) Contacts:
Mallicka Bannerjee 9474722351
Rama Sarkar Das 9830109475
Subhankar Naha

Sh. Amlanjyoti Kar, Secretary, INC-IAH has also delivered invited talks organised by the Naba Barrackpore Prafulla Chandra Mahavidyalaya, North 24-Parganas District, W.B. on the occasion of celebration of the World Water Week. The speech is available in the Youtube



SOCLEEN
(Society for Clean Environment)

in association
with



**National Society of the
Friends of the Trees**



वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
(विज्ञान एवं औद्योगिक अनुसंधान, नवीय संस्था)
MINISTRY OF SCIENCE & TECHNOLOGY, GOVT. OF INDIA



**International Association
of Hydrogeologists**



22ND MARCH 2022



09.30 AM 06.30 PM IST

Organizes Webinar on

WORLD WATER DAY

Resource Persons

Theme "Groundwater – Making the invisible visible"



Dr. T N Mahadavan
Founder Member of SOCLEEN,
Ex-Head of Section under Environment
Assessment Division, BARC, Mumbai



Prof. (Dr.) Arun D. Sawant
Ex-Vice Chancellor (Univ. of Rajasthan)
Ex-Pro VC (Univ. of Mumbai)
President SOCLEEN, & President, National
Society of Friends of Tree, Mumbai



Prof. Shakeel Ahmed,
Hon Professor, School of Sciences, Maulana
Azad National Urdu University, Hyderabad.
Emeritus Professor CSIR -ACSR,
Secretary, Asian G-WADI, (UNESCO)



Dr R. C. Jain,
Advisor (Groundwater), GWRDC Ltd.,
Gandhinagar. Ground Water Management Expert,
Maharashtra, Water Resources Regulatory
Authority. Ex-Chairman, Central Ground Water
Board, River Development &
Ganga Rejuvenation, (Govt. of India.)



Dr. Rakesh Kumar
OSD (CSIR), Council of Scientific &
Industrial Research, New Delhi. Adjunct Prof.
at CESE, IIT Bom. Visiting Faculty at
Drexel University, Philadelphia, USA



Dr. Mahendra Mehta,
Former Commissioner,
Ministry of Water Resources,
Government of India



Professor (Dr) A. K. Sinha Vice-Chancellor,
CSM University, Navi Mumbai. Member, Governing
Council, IUAC, GOI, New Delhi. President, Indian
National Chapter of International Association of
Hydrogeologists (INC-IAH). Chief Coordinator,
Groundwater Community Forum.



Dr. S.N. Rai,
Ex-Vice President: International Association
of Hydrogeologists (IAH). Visiting Fellow, IIT,
Roorkee, Chief Scientist, CSIR-NGRI

Free Registration: <https://forms.gle/U2vITJZs3hoBhwLH8>

A webinar was organised by the Soc for Clean Env.(SOCLEEN) in association with Nat. Soc. of the friends of the trees, CSIR and INC-IAH to celebrate the World Water Day, where amongst the other distinguished speakers, Prof A .K.Sinha,Vice Chancellor CSMU,Navi Mumbai and President, INC-IAH, Dr M.Mehta, Former commissioner (GW), Dr S N Rai, Chief Scientist(Retd), NGRI and Member INC-IAH were the other prominent speakers.



**Department of Geography
Faculty of Physical Sciences,
Chaudhary Bansi Lal University, Bhiwani**

in association with

Indian Chapter of International Association of Hydrogeologist

National Webinar

Groundwater - Making the Invisible Visible



Invited Speaker
Prof. B. S. Chaudhary
Department of Geophysics
Kurukshetra University, Kurukshetra & Executive Members
Indian Chapter of International Association of Hydrogeologist



Patron
Prof. R. K. Mittal
Vice Chancellor CBLU, Bhiwani



Co-Patron
Mrs. Reetu Singh
Registrar CBLU, Bhiwani



Convener
Dr. Pawan Kumar
In-charge, Department of Geography
CBLU, Bhiwani

24TH March, 2022

Time: 03:00 PM



meet.google.com/yjq-cjct-fgd

A webinar was jointly organised by the Dept. of Geography, Chaudhary Bansi Lal University, Bhiwani to celebrate the World Water Week in association with INC-IAH, where amongst the other distinguished speakers, Prof. B. S. Chaudhary, Dept. of Geophysics, Kurukshetra University and Executive Member, INC-IAH has delivered an invited talk.



DR. B. R. AMBEDKAR INSTITUTE OF TECHNOLOGY

Port Blair, Andaman & Nicobar Islands



In Collaboration with



INDIAN NATIONAL CHAPTER OF INTERNATIONAL ASSOCIATION OF
HYDROGEOLOGISTS

THE INSTITUTION OF ENGINEERS (INDIA)

Observation of

WORLD WATER WEEK

(21.03.2022 – 26.03.2022)

THEME: Ground Water: Making the invisible visible

DATE: 26-Mar-2022

PROGRAMME SCHEDULE

Speaker	Topic	Time
Dr. S. Raji Lecturer (Civil Engg. Dept.) & Center Coordinator(IWRR), DBRAIT	IWRR by DBRAIT – Creating database suggesting water conservation method in rural area of A&N Islands	10 - 10:45 AM
Engineers of APWD & Scientists of CIARI	Water supply and its augmentation in A&N Islands	10:45-11:30 AM
Dr. AMALANJYOTI KAR Former Regional Director, CGWB & Authority, Ministry of Jalshakti, Govt. of India Secretary, INC-IAH	Scope of conservation of fresh water and artificial recharge in the remote A&N Islands.	11:30 - 12:15 AM

A webinar was jointly organised by the DBRAIT (Dr. B. R. Ambedkar Institute of Technology), Port Blair and Institution of Engineers, India to celebrate the World Water Week in association with INC-IAH, where amongst the other speakers, Sh. Amlanjyoti Kar, Secretary, INC-IAH has delivered an invited talk on the topic "Scope of conservation of freshwater and artificial recharge in the remote A&N Islands"



SM Kanwar

Former Chief Engineer,
Ground Water
Department, Rajasthan
Former Expert Member,
Drinking Water &
Sanitation Council,
Govt. of India
E:satendramohankanwar
@gmail.com,

Artificial Ground Water Recharge in Alluvial Formation with Recharge Shaft without Pipe Assembly

In year 2001, I was State Nodal Officer for Ground Water Management and Artificial Ground Water Recharge in Rajasthan. At that time Rajasthan Ground Water Department constructed a large number of Artificial Ground Water Recharge Structures in important Government Buildings at Jaipur City with financial and technical input from Central Ground Water Board. According to CGWB design of artificial recharge through a tubewell (Recharge Shaft), as per approved design, pipe assembly was installed in recharge shaft. During finalization of different designs of recharge structures, I had proposed a recharge shaft in alluvial formation without pipe assembly and proposed to take its depth minimum upto water level. Following was the justification of design which was named as Modified Recharge Shaft in Alluvial Formation Without Pipe Assembly.

Modified Recharge Shaft without Pipe Assembly Justification:

- In recharge tubewell, the slotted pipes are installed against aquifer length. Total slotted pipes, against aquifer are generally 40% of total pipe assembly length. Slotted pipes have maximum 16% open area. So, open area of total length of pipe assembly is $(16\% \times 40\%)$ 6.4%.
- Now if we donot install the pipe assembly and only filter media is packed, the recharge shaft has free movement of water in full length of the shaft i.e. 100% length of shaft.
- Thus Recharge Shaft without Pipe Assembly recharges 16 times more water as compared to artificial recharge through pipe assembly recharge shaft..
- Cost wise cheaper: In case of recharge shaft with pipe assembly, we lower pipes in recharge shaft. The cost of pipe assembly is about 10 times the cost of construction of drilling a recharge shaft..
- Therefore, a recharge shaft without pipe assembly is 16 times more efficient and cost wise 10 times cheaper.
- CGWB raised doubts against successful working of the recharge shaft without pipe assembly on two accounts.
 - In case pipe assembly is not lowered, the formations would collapse and so the shaft will become non-functional immediately, or after some time of construction.
 - Second point was that in subsequent years, no maintenance of the shaft can be undertaken.

- I explained CGWB giving example of construction of tubewells in Bikaner, Barmer and Jaisalmer Districts, where a tube well depth is more than 200 meters. After construction of a borehole to a depth more than 200 meters, extraction of drill pipes takes about 6 to 8 hours. The pipe assembly preparation and lowering along with welding process takes 12 to 16 hours. After that gravel, packing takes about 6 to 8 hours. During these all processes, the borehole is maintained by keeping the borehole filled with drilling fluid. So in construction of a recharge shaft of about 200 meters depth, the borehole can definitely be maintained from collapsing before packing of filter media for 24 to 32 hours.

On basis of above justification, I was permitted to construct Recharge shaft of this Modified Design. Following was the design of such a shaft.

- Construct a bore hole of about 400-450 mm diameter upto proposed depth..The borehole is back washed for 3 to 4 hours.
- A PVC vent pipe of 50 mm diameter is lowered in the borehole in total length of drilled borehole to avoid any airlock during process of recharge Gravel packing is started with top of PVC pipe connected with mud pump, which continues to operate at slow speed, so that fluid circulation is filled up upto top of bore hole and this level is maintained in the borehole during gravel pack. The hydraulic pressure of fluid prevents collapse of shaft borehole.
- With the flow of fluid or clean water through vent pipe maintains the borehole and on other hand, it washes the filter media, and manages its proper packing without any breezing.
- This vent pipe leaves no chance of any air lock while recharging the water. This vent pipe functions as the media for any future maintenance in the borehole or cleaning of filter media in near future in case of any silt deposit in filter media.

Depth Criteria: Alluvial aquifers are massive with respect to storability and transmissibility. With shallow depth of shaft, recharge water in dried up aquifers will not remain localized and will spread laterally Recharged water will dissipate in the shallow aquifer and will not become part of the hydro-geological cycle of abstraction i.e. it will not be available for use. A very huge quantity of recharge water will be required for reaching to water level due to high storability.

With recharge at the same depth of aquifer from where water is withdrawn i.e. upto or below water table, first recharge will take place in bottom and after its saturation, water will move upwards as well as laterally from bottom. This recharged water will be available readily for use. **Therefore, depth of recharge shaft should be minimum upto level from which water is withdrawn.**

This Modified Design was accepted in year 2001 and I was permitted to construct first recharge shaft of this Modified Design by the State Ground Water Management & Artificial Ground Water Recharge Committee in year 2001 and as per decision first Modified Recharge Shaft was construction at Jhalana Dungari campus of Ground Water Department, Jaipur: Even after 21 years of construction, this Modified Design Recharge Shaft is working without ANY maintenance of the Shaft.(Diagram of this recharge Shaft given below)

[Results of about 100 Artificial Recharge shafts drilled with Rotary Rig in Village Kaladera, District Jaipur, under supervision of me and water table monitored by the Ground Water Department \(GWD\):](#)

About 100 shafts of 400 mm diameter and 100 meter depth were constructed in the year 2004 under my technical supervision. The water table as monitored by GWD from year 1999 to 2005 in village Kaladera and villages in East, West, North and south of village Kaladera. The results show that water table depleted in all 5 pizometers from year 1999 to year 2004. In year 2005, the water table continued to deplete in villages in four directions of village Kaladers. However, because of recharge through Kaladera recharge shafts, the depletion of water table was checked and there was an increase of 0.50 meter in village Kaladera.

Modified Recharge Shafts Construction at Hero Honda (Now HeromotoCorp) Gurgaon.:I was requested by M/s Silveron, Jaipur in Dec.2010 to solve the problem of water logging and rainwater harvesting in Herohonda Ltd. Gurgaon (Now HeroMoto Corp). I arranged construction of a recharge shaft of Modified Ground Water Department Design with a rotary rig, having 18" diameter with drilling fluid only water, without use of Bentonite mud or any other clay. Drilling Depth was 300 feet. I lowered a PVC vent pipe of 50 mm diameter and filled up filter media. It proved to be a very good recharge shaft . About 25 such recharge shafts were constructed.

Results according to Manufacturing Head of Hero MotoCorp, as published in Friday Gurgaon magazine in November -12 "The Hero Group had to involve a Rajasthan based expert to develop and design a different harvesting structure for its Gurgaon plant- and the results have been exemplary. Not only are his costs down but the water logging inside the Plant has reduced substantially, and the water table is also stable" It proves successful implementation of rain water harvesting with technique of recharge shafts constructed with a rotary rig . Such recharge shafts give very good results and are of very low cost

[CGWA clearance for Start of HeromotoCorp Neemrana,, District Alwar, Rajasthan :](#) Heromoto Corp Neemrana got clearance from CGWA based on DPR prepared by me based on recharge shafts of this Modified Design. The recharge shafts were designed to recharge only stagnant water in the water bodies of nearby villages, which otherwise was to be evaporated. Recharge Shafts Constructed with Rotary Rig, packed with filter media after installation of PVC Vent pipe. A pit is dug around the recharge shaft and double Cement rings system is installed on recharge shaft, duly filled with filter media

[illegible]

RWHS at GWD Building

Run off area -1050Sq.mtr.

Available run off –

456.96cu.mtr per year

Per hour run off at 30 mm per
hour rain fall -26.77 cu .mtr.

Structures

Drainage System to bring water from roof top to surface and then to silting pit

Silting pit

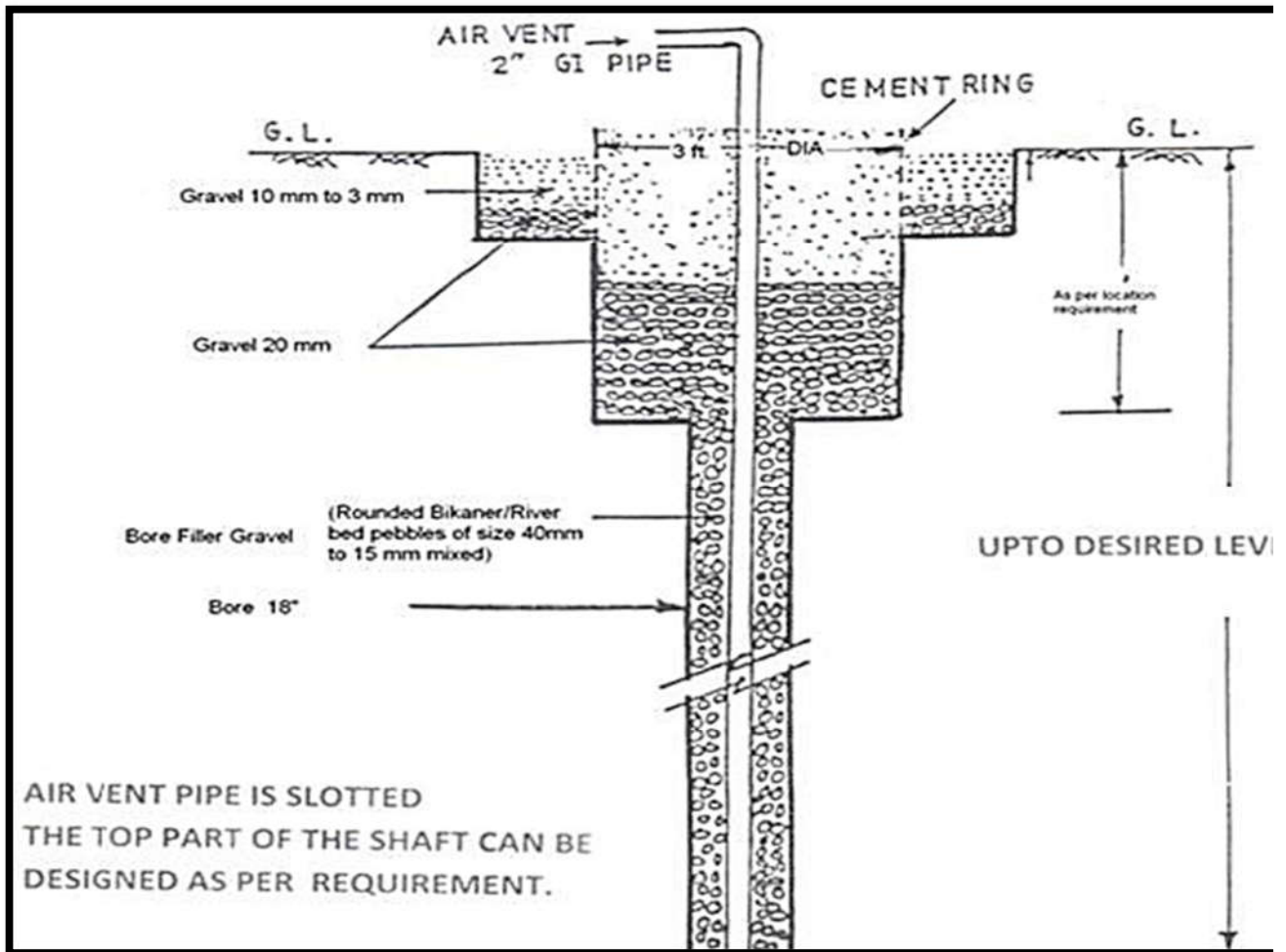
Trench with filter media
Tubewell without pipe
filled with filter media

Inflow rate of structure
inclusive of system storage
capacity - 337 cu mtr./hour

Unit cost of recharge

Rs. 0.034 per liter

Recharge Shaft at Heromoto Corp Gurgaon and Neemrana : Design and Photograph of one Water Body



Photograph of water bodies with recharge shafts were taken before rains, after rains on 25.8.12 when the water bodies had received rain water and after seven days on 2.9.12. Rain water was recharged of full quantity at some locations and partial at some locations where bodies were of bigger size. Dosod Low Land Shaft near CGWB



Recharge Shaft Status on 25.8.12 after Rains



Status on 2.9.12 after 7 days of Rains

Particulars of Recharge Shafts Constructed in Heromoto Corp, Neemrana Plots & Storm Water Harvesting in nearby Water Bodies

Annual roof top & storm water available from Plots area : Cubic meter	93098
Recharge Shafts : 450 mm diameter; 90 meter depth ; No. of shafts	38
Inspection chamber : 1 meter diameter; 3 meter depth; No. of chambers	8
PVC connection pipe : 200 mm diameter : Length of pipes : meters	2000
Life of structures : years	20
Rain water available from plots area for recharge in 20 years; mcm	1.86
Approximate recharge cost of recharge structures: Rs. In lakhs	100
Repair & maintenance cost of 20 years @ 5%: Rs. In Lakhs	100
Total cost in span of 20 years: Rs. In Lakhs	200
Cost per cubic meter : Rs.	10.75
Cost per Liter : Paisa	1.0175
Storm Water Harvesting in Water Bodies in near by villages of Neemrana	
Recharge Shafts : 450 mm; 60 meter depth : Number of shafts	91
Cost of Recharge Shafts: Rs. In lakhs	120
Life of structures : years	20
Repair & maintenance cost of 20 years @ 6.25%: Rs. In Lakhs	150
Total cost in span of 20 years: Rs. In Lakhs	270
Rain water available from water bodies area for recharge in 20 years; mcm	336.4
Cost per cubic meter : Rs.	1.00
Cost per Liter : Paisa	0.10



Dr. Anadi Gayen

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Sustainable Development Goal (SDG) towards Village Water Security in India

1.0 Introduction

Village people are confronting numerous water-related issues and challenges. The major problem in rural India is drinking water availability. Water supply facility in the village habitations are having wide range of fully covered to partially covered and sometimes partially covered to not covered habitations. The reasons in this regard may include the growth of population, groundwater level depletion, and water quality problems i.e., arsenic, fluoride, nitrates, iron, and salinity hazards. Villagers do have not sufficient access to the purified drinking water on account of reasons like low income, technical solutions, lack of community participation, and water contamination from agricultural return flow containing chemicals, pesticides, herbicides, chemical fertilizers, industrial effluents and unscientific waste disposal followed by the absence of proper sustainable management of drinking water.

A vision is of pre-requisite to make village water sufficient, which may include functional house tap connections to all, with targeted potable water supply, scientific water management in combination with copious water availability for agriculture, and to meet the various needs followed conservation village water ecosystem.

2.0 Aims and Objectives

- i) Ensure access to sufficient clean water to all villagers and drinking water facilities.
- ii) Make sure the sanitation amenities to the village people.
- iii) Make sure 100% of Individual Household Latrine (IHHL).
- iv) Improve the mechanism of polluted water treatment and purification.
- v) Ensure 100% Open Defecation Free (ODF).
- vi) Address groundwater depletion along with arsenic and fluoride contamination.
- vii) Rainwater harvesting and recharge to groundwater.
- viii) Maintain ecosystem through conservation of natural resources.
- ix) Encourage better hygiene behaviour amongst the population and develop cleanliness through the initiation of solid and liquid waste management projects in the villages.
- x) Device the mechanism to fight the adverse impact of climate change.

3.0 Role of Pachayats/ Panchayat Raj Institutions (PRIs)

Gram Panchayats are having a key role to play in village water security. The following steps are to be adopted to achieve the targets:

1. To educate every household about the salient aspects of optimum uses and management of water.
2. To hasten the efforts towards achieving total sanitation coverage, improve cleanliness and eradicate ODF at the village level.
3. To generate demand for toilets for sustained use by all the household members in the villages.
4. To ensure adequate and functional toilet facilities for all boys and girls in schools and Anganwadi.
5. To ensure the maintenance of public toilets in markets and Gram Panchayat premises.
6. To determine suitable cost-effective eco-friendly technology for village water supply and domestic polluted water treatment.
7. To liaise with the agencies (preferably the Government) for providing sufficient water supply, fresh drinking water, water sample analysis, and water level measurements to monitor the behaviour of the groundwater regime over the years.
8. To form a committee of the village people and enhance their capacities to plan, manage, maintain, and periodic monitoring of the existing and created water-oriented infrastructures, especially drinking water.
9. To promote modern water-efficient technologies and precision agriculture to save water.
10. To protect water bodies, reservoirs, dams, and canals and regular monitoring of their qualities.

The Panchayati Raj Institutions (PRI) is a nodal point functioning at the district level, which is responsible to facilitate the strategy-making, organizing, monitoring, and implementation of the national programmes as and when required. The Gram Panchayats can organize the village communities, educate, impart training and provide support to ensure their active participation through Village Water and Sanitation Committees to accomplish the village drinking water security. The Gram Sabha is the main platform for decision-making and approving need-based plans.

4.0 Management Challenges and Way Forward

Village Water Security aims to supply non-toxic, fresh, and sustainable water for the inhabitants of a village. It places stress on community-owned and scientifically well-coordinated systems with proper institutional mechanisms to confirm uniform access and purpose-cantered. Village level water security plan is a method that figures based on the principles of resource assessment, integrated water resources management, water budgeting, and water auditing for achieving the sustainability of locally available water sources. Conjunctive use of village water resources is of prerequisite to optimizing the utilization of water for irrigation, domestic, and livestock.

In addition to the demand and supply management of water resources in the villages, due care is needed towards the following components:

1. Controlling groundwater extraction and enhancing recharge options.
2. Harvested and filtered rainwater could be used for toilets, home gardening, lawn irrigation, and small-scale agriculture.
3. Water used for domestic purposes may be reduced, reclaimed, recycled, or reuse for gardening, toilets, and gardening purposes.
4. Farmers may switch over from using open canals and flood irrigation to sprinkler and drip irrigation systems (Precision agricultural system).
5. Systematic scientific investigations in the development and management of water resources can provide as per the needs of the population living in the area.
6. Enhancement of infrastructural capabilities of Government institutions / NGOs at the village level for implementing integrated water security plans for the water-scarce villages.
7. Encouragement of community participation, Public Interaction Programmes (PIP), Water education, Awareness Programmes, and sensitization to the villagers about water problems.
8. Through improving water infrastructure must be a priority, since water conservation and productivity are crucial components of sustainable water management.
9. Restricting water pollution and improving sewage treatment methods.
10. Promotion of village water conservation through awareness generation via community radio.
11. Enabling the community to manage their water issues.



Community participation in the village water security plan

To improve the village level water security and to enhance the water availability and quality followed by lessening the risks from water-related catastrophes, the following nature-based solutions may be adopted:

1. Wetland restoration.
2. Plantation of trees.
3. Mangrove conservation.
4. Protection of natural waterways/ existing water bodies/ reservoirs.
5. Preservation of flood plains.
6. Conservation of bushes/ greeneries.

They can also play a dual role in tackling climate change and may support both the mitigation and adaptation outcomes. The holistic water management approach would be accommodating in systematic maintenance and sustainability of groundwater resources and simultaneous restriction of further depletion of groundwater levels in the villages.



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Case study of aquifer mapping in Tawarja basin, District Latur, Marathwada region, Maharashtra state

Marathwada region of Maharashtra state of India is well known for severe water scarcity. Few years back water was supplied by railways tankers to meet the water supply demand of the people of Latur district. Tawarja basin falling under Latur district was selected for aquifer mapping to know the availability of groundwater in this draught prone area where groundwater is the main source of water supply for irrigation and domestic uses. During survey period we came across hundreds of dry bore wells which were drilled without any scientific investigations. In general 9 bore wells out 10 bore wells are found dry. Tawarja river basin covers an area of 642 km² between 18°12'16" to 18°24'15" north latitudes and 76°15' to 76°41'35" east longitudes. The entire basin is covered by basaltic Deccan traps below soil cover of varying thicknesses. Electrical resistivity tomography has been conducted at 35 locations in the western part of the basin in order to delineate aquifers and suitable sites for managing aquifer recharge. Locations of ERT survey are shown in figure 1.

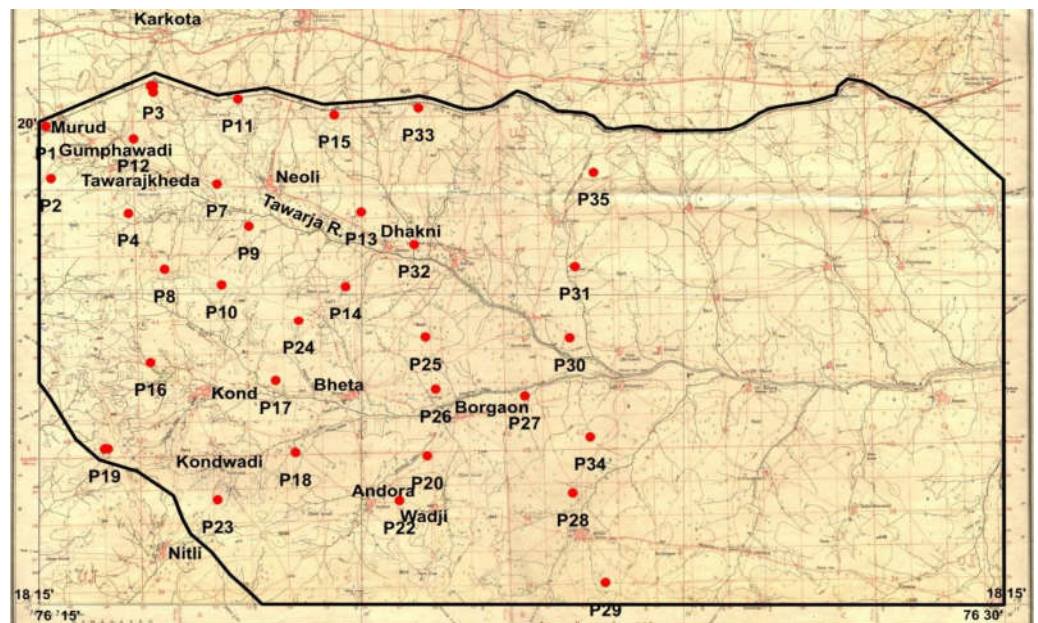


Figure 1: Locations of ERT sites in the map of Twarja basin (Source: S. N. Rai et al, Jour. IGU, 19(3), 256-269, 2015)

We came across a site falling under Kond village where one bore was completely dry while only about 100 m away another bore well was found yielding enough water used for irrigation This bore well is owned by Angad Yadav. In order to explain the owner of the dry bore well the reason for not availability of groundwater, we conducted ERT survey along a profile which passes through nearby both the bore wells. 2-D resistivity model along the profile is presented in figure 2. The small vertical lines on top of the model represent the 10 m spacing between two adjacent electrodes. The distance is measured from north to south marked by N and S in the figure. The depth of investigation is 115 m.

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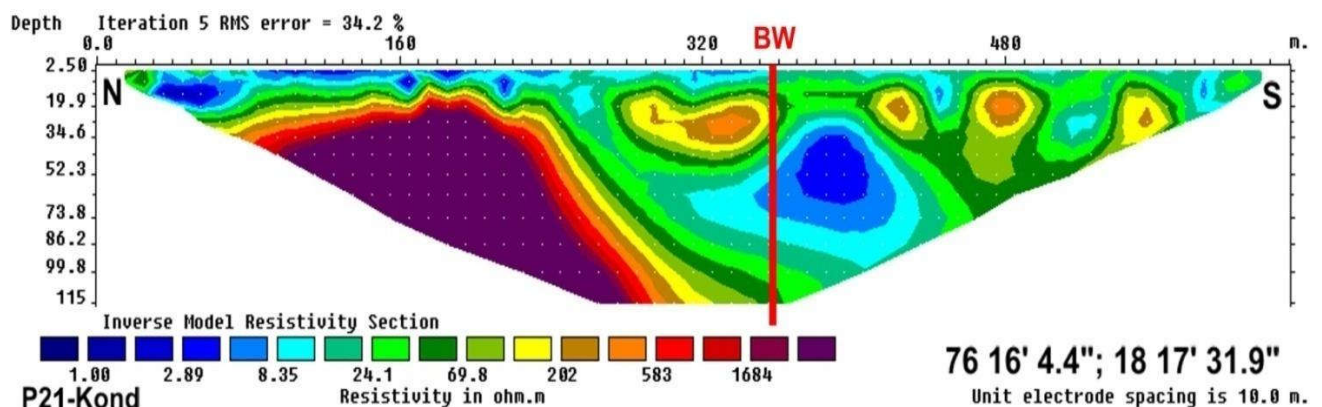


Figure 2: 2-D resistivity model showing groundwater potential zone characterized by resistivity values in the range of 20 to 40 ohm m.

This model indicates that up to 250 m, the subsurface is underlain by massive basaltic formation having > 600 ohm-m resistivity values below thin cover of alluvium. This massive basaltic formation is further extended south ward which is visible up to 280 m underneath the water bearing weathered formation. Intertrappean sedimentary formation in different shades of blue colour (<15 Ohm m) can be also seen in the model. The dry bore is located at about 260 m which penetrates through only massive basalt. Hence this well is dry. On the other hand the water yielding bore well marked by red vertical line penetrates through groundwater bearing zone which is characterized with resistivity value in the range of 20 to 40 Ohm-m. Resistivity model also indicates two suitable sites for construction of pond for groundwater recharging. One site can be between 230 m to 270 m and another one between 360 m to 400m.

Figure 3 presents comparison of the sequence of geological formations obtained from resistivity model with the sequence obtained from the bore well. Similar groundwater potential zones have been delineated at several sites of ERT. These potential aquifer systems if developed can meet the water supply demand of the region. Such information is essential to the farmers before drilling of a bore wells. This will not only save several crores of rupees spent on drilling dry bore wells but also can save precious life of farmers who commit suicide because of economic losses. Such measures can bring prosperity in the region. This is only possible if any government department is created which can provide information to the farmers about the suitable sites for bore well drilling and construction of infrastructures for ground water recharging.

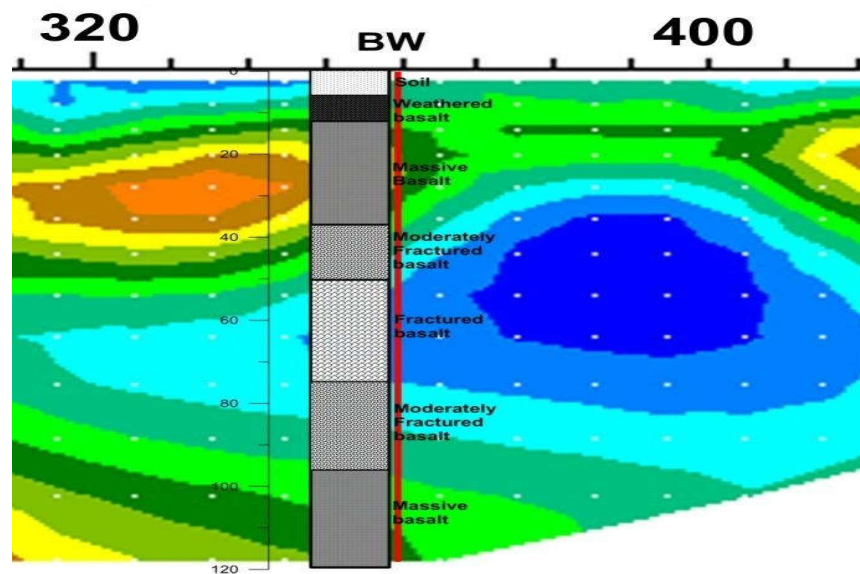


Figure 3: Comparison of the sequence of geological formations obtained from resistivity model with the sequence obtained from the bore well .

Applied Hydrogeology Award 2022 – open for nominations



We are pleased to call for nominations for the 2022 'Applied Hydrogeology Award'. This award aims to recognise those who have made an outstanding contribution to the application of hydrogeology, resulting in an increase in living standards in low and middle income countries. We would especially like to receive nominations for our many colleagues who have less opportunity to publish papers in scientific journals and whose work is perhaps less well-publicised but nonetheless essential.

A panel appointed by IAH Council will review the nominations and it is intended that the award will be presented in September at the 49th IAH Congress in Wuhan, China.

Any IAH member may nominate a candidate, but self-nominations will not be accepted. Candidates do not need to be members of IAH. Nominations should include:

- An explanatory statement by the person submitting the nomination (up to 300 words);
- A letter of recommendation by any other supporter (up to 300 words);
- A brief career history of the candidate (up to 300 words);
- A list of projects the candidate has carried out, including aims, region and period of time;
- A list of projects (planned or accepted), patents, publications or equivalent information.
- And finally, if you had just 1 minute to persuade the panel why your nominee deserves the award, tell us what you would say, using not more than 100 words!

Your proposal must be in total be no longer than 5 pages of text in a single pdf-file. This should preferably be in English. Although we are happy to accept nominations in other languages such as Spanish, French, German, Chinese or Arabic, the judging will be based on an English version (translation will be arranged by IAH's Secretariat). It should reach the IAH Secretariat by e-mail (info@iah.org) before Monday 4th July 2022. We look forward to receiving nominations from all our IAH Regions, to reflect the work of applied hydrogeologists across the world.

Find out more/nominate

info@iah.org

Disclaimer: This is to inform readers that the views, thoughts, and opinions expressed in the newsletter belong solely to the author and do not reflect the view of the INC-IAH.



Water Facts

- 75 % of our earth is covered with water yet 1.4 billion people live without clean drinking water.
- Two-fifths of the world's population lack access to proper sanitation.
- More than one-third of Africa, population lacks access to safe drinking water.
- 97 % of earth's water is in the oceans.
- Only 3 % of the earth's water can be used as drinking water.
- 75 % of the world's fresh water is frozen in the polar ice caps.



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Upcoming Groundwater Conferences

23 Aug – 1 Sept 2022 – Stockholm

World Water Week 2022

World Water Week 2022 takes place from 23 August to 1 September. For the first time, you can join us both online and in Stockholm, Sweden. This year we offer close to 300 sessions on the theme Seeing the Unseen: The Value of Water.

 <https://www.worldwaterweek.org/>

11-15 Sep 2022 – Copenhagen

Other Events

IWA World Water Congress & Exhibition

Water for smart liveable cities. This edition of the IWA World Water Congress & Exhibition will engage stakeholders and key contacts within the conventional water sector and beyond. It will bring together core water sector groups, such as those focused on urban water and urban water services, as well as participants from industry and agriculture, architects and urban planners, soil and groundwater experts and hydrologists, social scientists, the ICT sector, the financial sector, and others. With a strong representation and contribution from Nordic and Baltic Sea countries, the IWA Congress & Exhibition is a vital opportunity to learn about the Nordic water challenges and solutions, including participation in technical site visits.

Organised by IWA.

 <https://worldwatercongress.org/>

18-23 Sep 2022 – Wuhan, China

IAH Events

49th IAH Congress, China

Groundwater Sustainability and Poverty Reduction. The theme of the 49th IAH Congress is "Groundwater Sustainability and Poverty Reduction". Poverty reduction is a top priority for most countries in the world. Unfortunately, most of the poor countries and regions have been faced with serious problems of water scarcity and contamination. It is the mission and ultimate responsibility of the international community of hydrogeologists to help the people get access to sustainable safe supply of fresh groundwater. With your active participation to share your ideas, experiences and knowledge, we believe this congress in China will be a great success, and look forward to meeting you in Wuhan!

 <http://www.iah2022.com> and watch video: <https://youtu.be/nEOqZPOf-84>

16th-19th Oct 2022 - Cairo

Cairo Water Week : Water at the Heart Of Climate Action

CWW 2022 main theme will be "Water at the Heart of the Climate Action" from 16th to 19th of October, 2022, where water actors and stockholders around the world would have the opportunity to present and discuss key issues, policies, strategies, plans, and measures related to climate-water challenges. The Ministry of Water Resources and Irrigation will organize the CWW in collaboration with national, regional, and international partners, under the auspices of H.E. Mr. Abdel Fatah El-Sisi, President of the Arab Republic of Egypt

 <https://www.cairowaterweek.eg/cww2022/>

- More than 130 million people in Latin America and the Caribbean lack access to safe drinking water.
- Between 15 and 20 percent of the water used worldwide is not for domestic consumption, but rather for export .



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Water Facts

- Three-quarters of the Earth's surface is covered with water, yet 98 percent is salt water and not fit for consumption.
- Less than one percent of all the water on Earth is freshwater available for human consumption.



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7-8 Dec 2022 – Paris

UN-Water Summit on Groundwater, 2022

IAH Events

The UN-Water Summit on Groundwater will be the culminating event of the 2022 campaign “Groundwater: making the invisible visible”, implemented by the dedicated UN-Water Task Force, co-coordinated by UNESCO and the International Groundwater Resources Assessment Centre (IGRAC), on behalf of UN-Water. The main messages from the Summit will be conveyed to the United Nations 2023 Water Conference. The event will draw attention to the topic of groundwater at the highest international level, using the UN World Water Development Report 2022 on groundwater as a baseline, and the SDG 6 Global Acceleration Framework as a guideline, to define actions towards more responsible and sustainable use and protection of this vital natural resource. The Summit will unify the statements from all major groundwater-related **events into one, comprehensive groundwater message for the [UN 2023 Water Conference](#).**

The UN-Water Summit on Groundwater will be a hybrid event and will take place on 7-8 December 2022 at UNESCO HQ, Paris, and online. A Pre-Summit Day, devoted to side events, will take place on 6 December 2022.

- Download the summit brief in [English](#) and [French](#), for more information and how to register.
- For those interested in hosting a side event, please click [here](#). Deadline is 10 July.

✉ <https://www.worldwaterday.org/stories-2021/story/un-water-summit-groundwater-2022>